

OPTex[®]

Series Laser Device

Training Documentation

OPTex[®] Series Excimer Laser



Lambda Excimer Lasers: Product Range

- OPTex
- COMTex 100 Series; 200 Series
 150 Series
- LPX® 200i Series; 300i Series
- LPF 200 Series
- LAMBDA Steel LS 670; LS 1000
- FIBex
- NovaLine 50 Series; 100 Series
 Litho Series

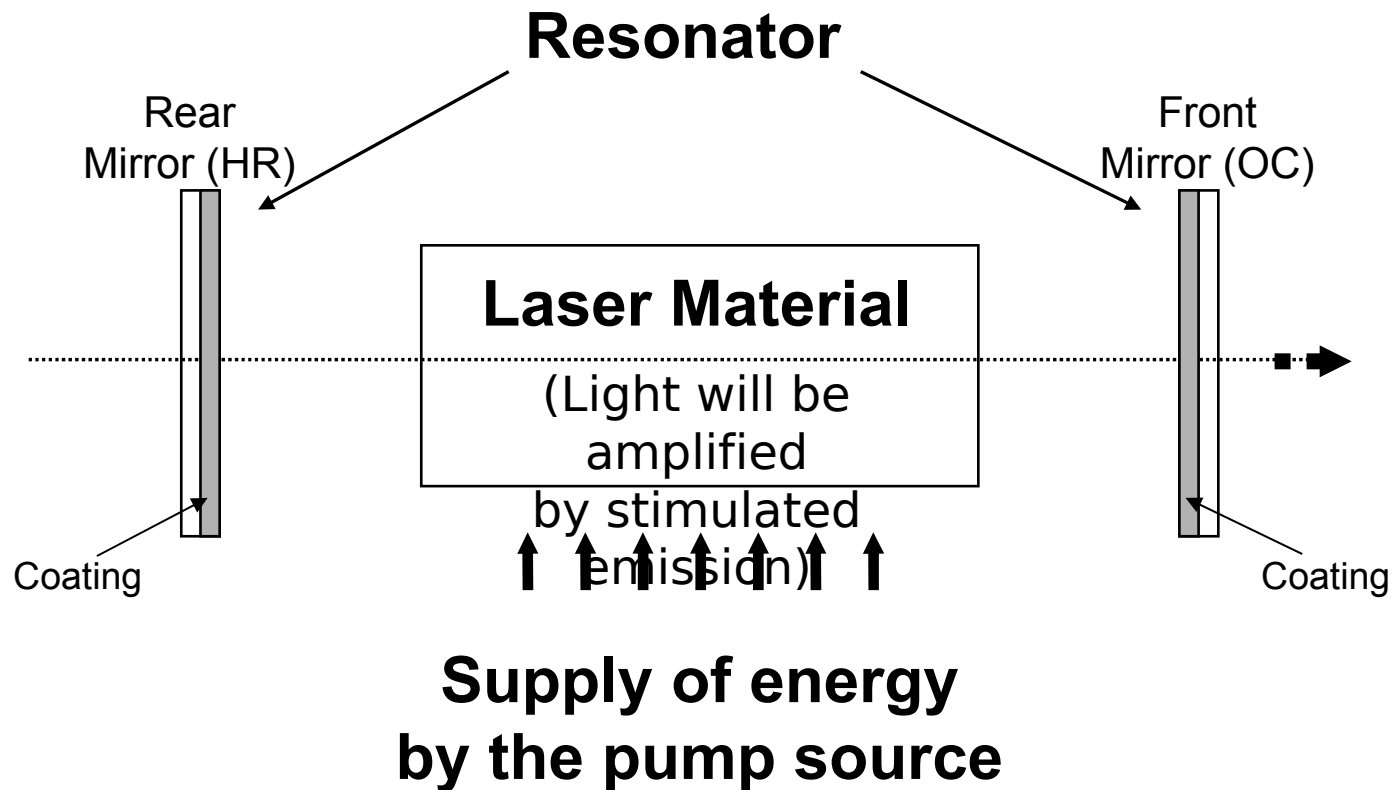
L. A. S. E. R.

- **Light**
 - **Amplification By**
 - **Stimulated**
 - **Emission Of**
 - **Radiation**
-
- (Lichtverstärkung durch stimulierte Strahlungsemission)

What is a Laser?

- **Monochromatic light**
- **Low divergence**
- **Coherent light**
- **Light with high intensity**

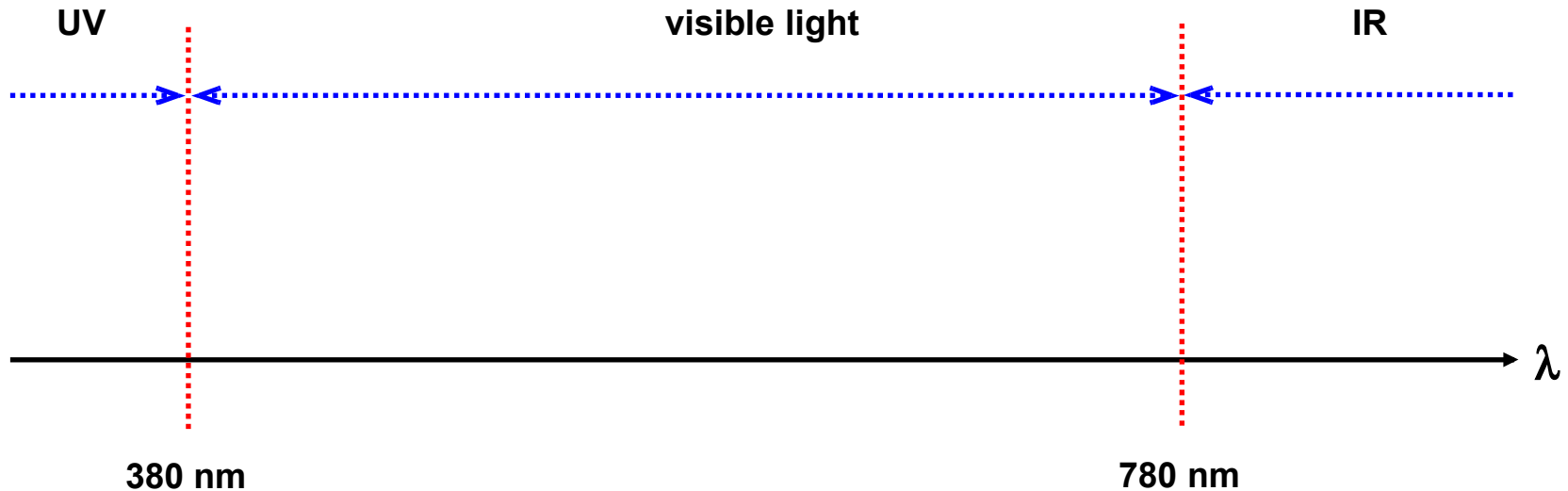
Laser Principle



Types of Lasers

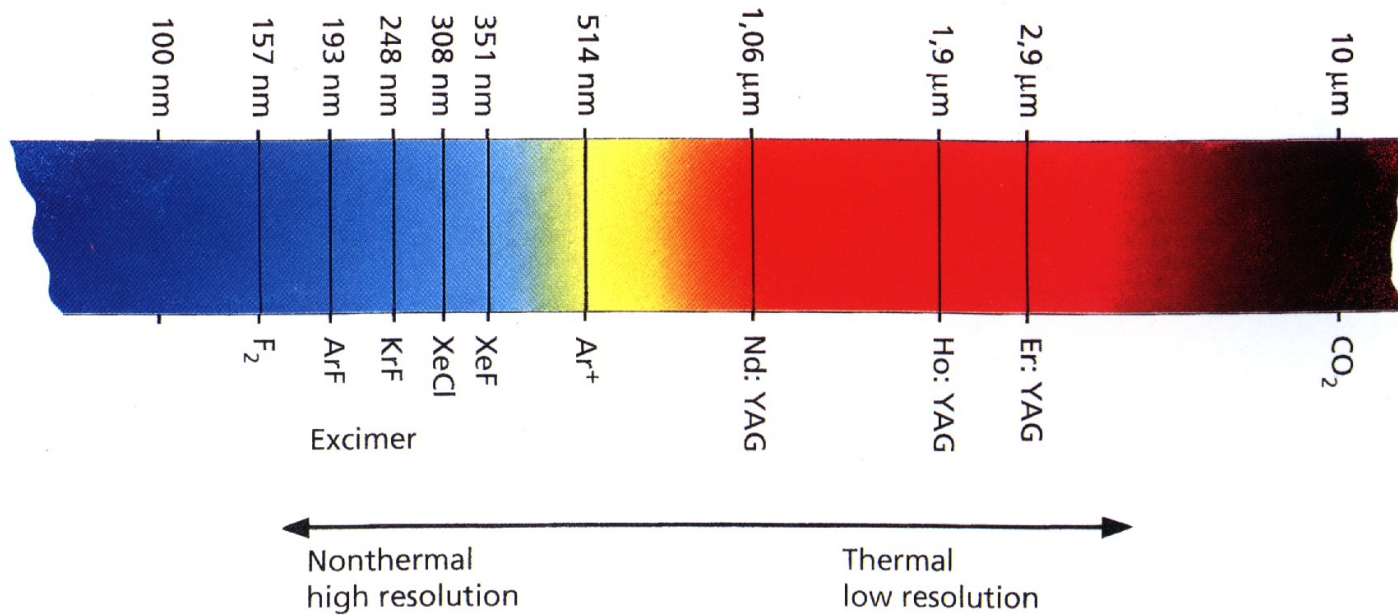
- All Solid State Lasers (Festkörperlaser)
 - Nd:Yag Laser
- Gas Lasers (Gaslaser)
 - Excimer Laser
 - HeNe Laser
- Dye Lasers (Farbstofflaser)
- Semiconductor Lasers (Halbleiterlaser)

Unit Indicator

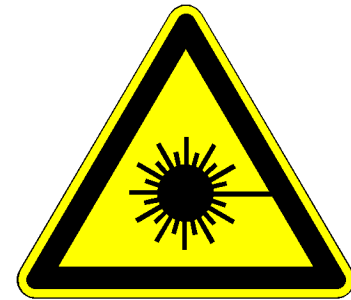
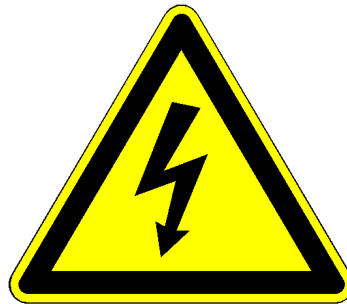


1 mm	= 0,001 m	= 10^{-3} m
1 μ m	= 0,000001 m	= 10^{-6} m
1 nm	= 0,000000001 m	= 10^{-9} m
1 pm	= 0,000000000001 m	= 10^{-12} m

Unit Indicator



Laser Safety Aspects



Excimer Laser

- **EXCIMER**

EXCIted DiMER

- **RARE gases**

Ar
Kr
Xe

- **HALOGEN gases**

HCl
F₂

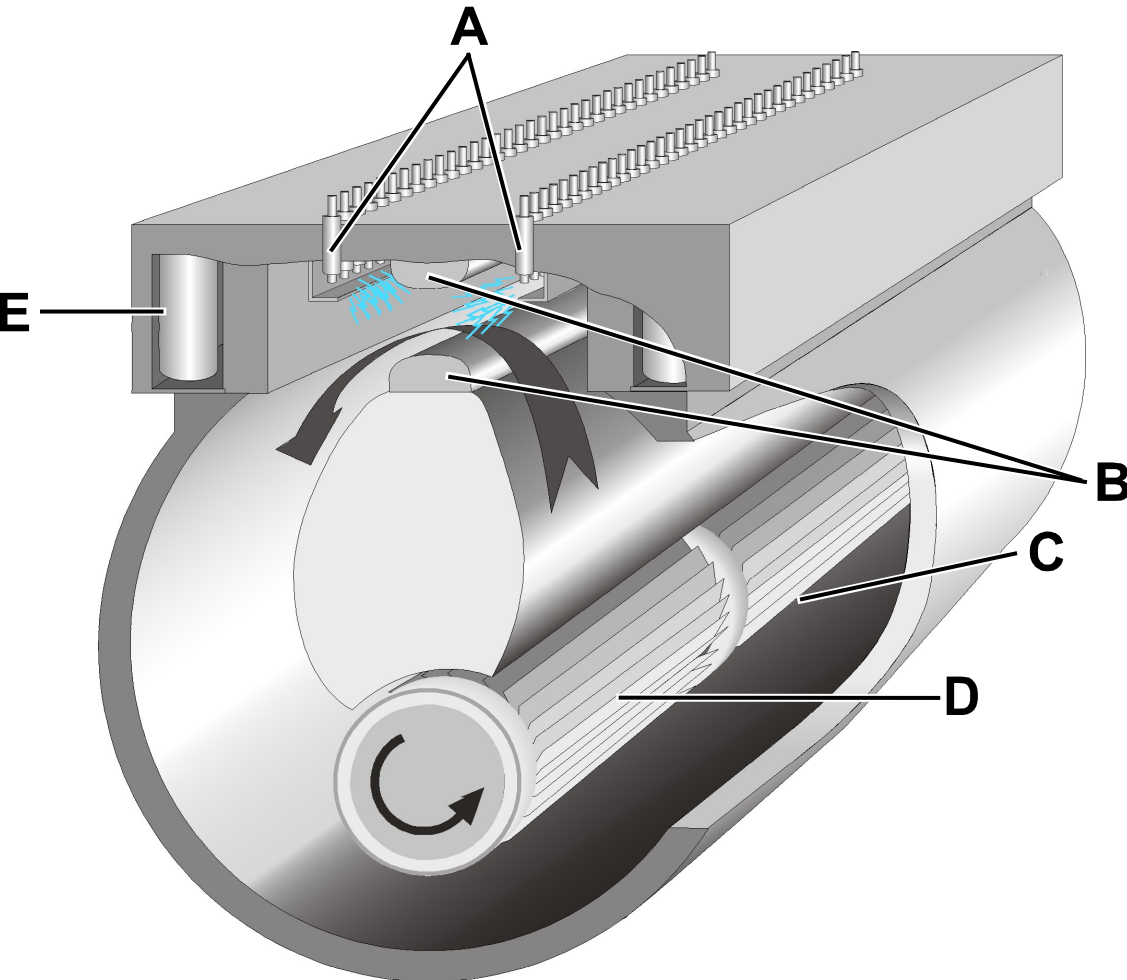
- **BUFFER gas**

Ne

- **INERT gas**

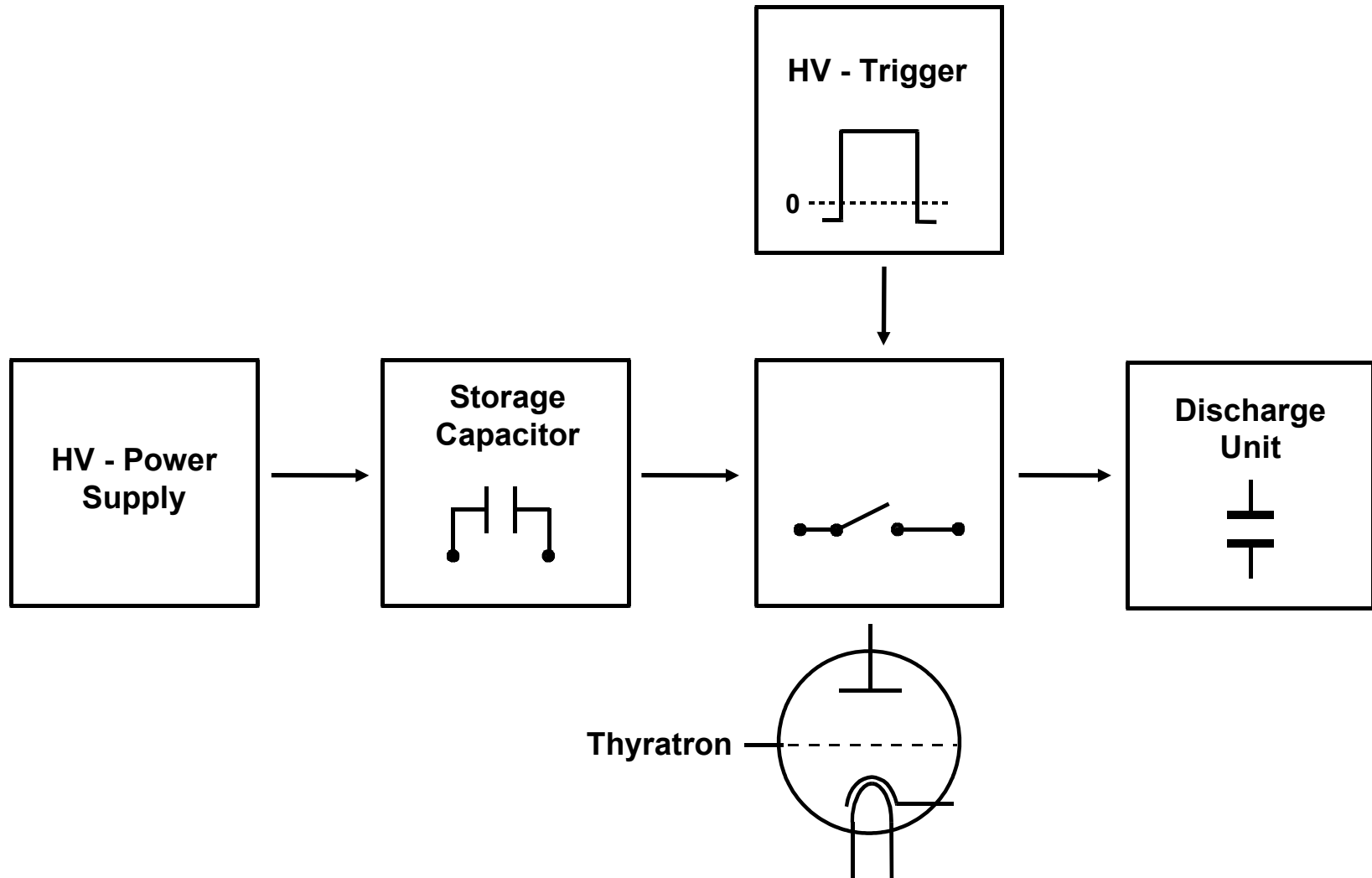
He

NovaTube Design



- A** Preionization Electrodes
- B** Main Electrodes
- C** Gas Reservoir
- D** Gas Circulation Fan
- E** Discharge Capacitors

Simple Block Diagram HV-Circuit

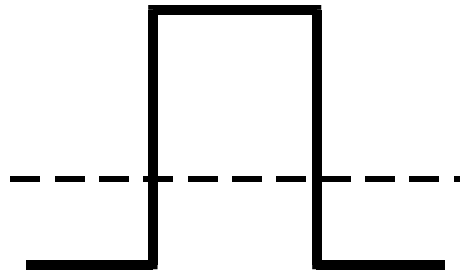


Principle of a Thyatron

Trigger up to 1kV

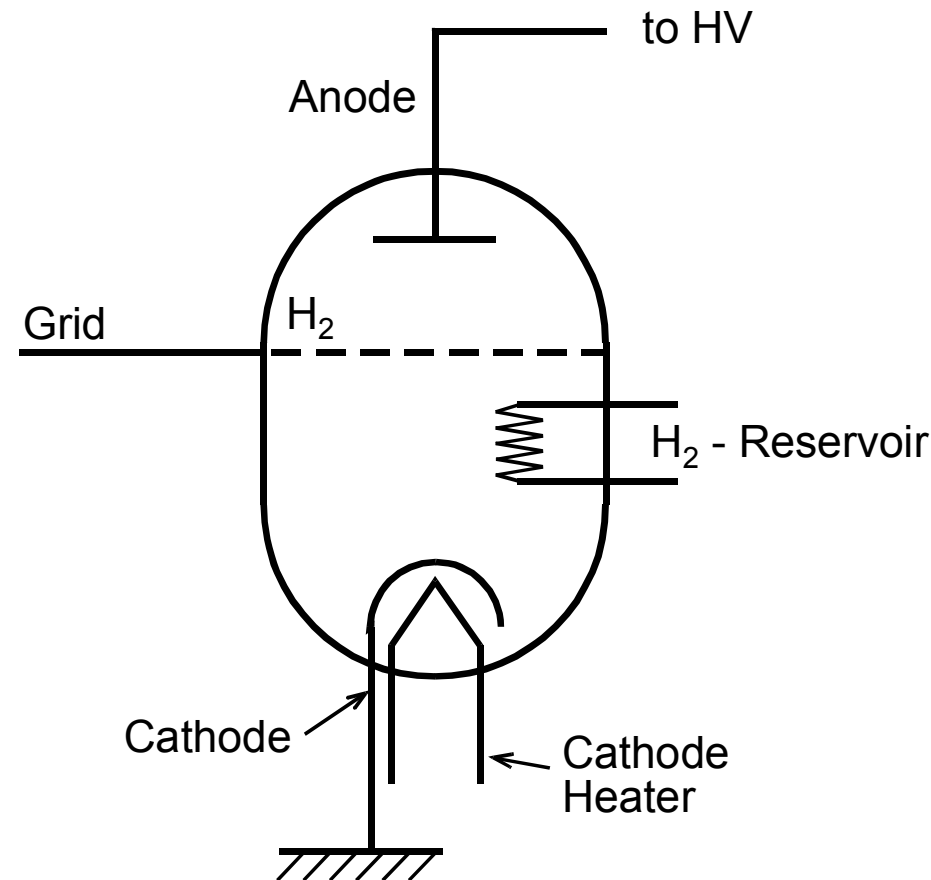
Ground 0V

Bias -150V

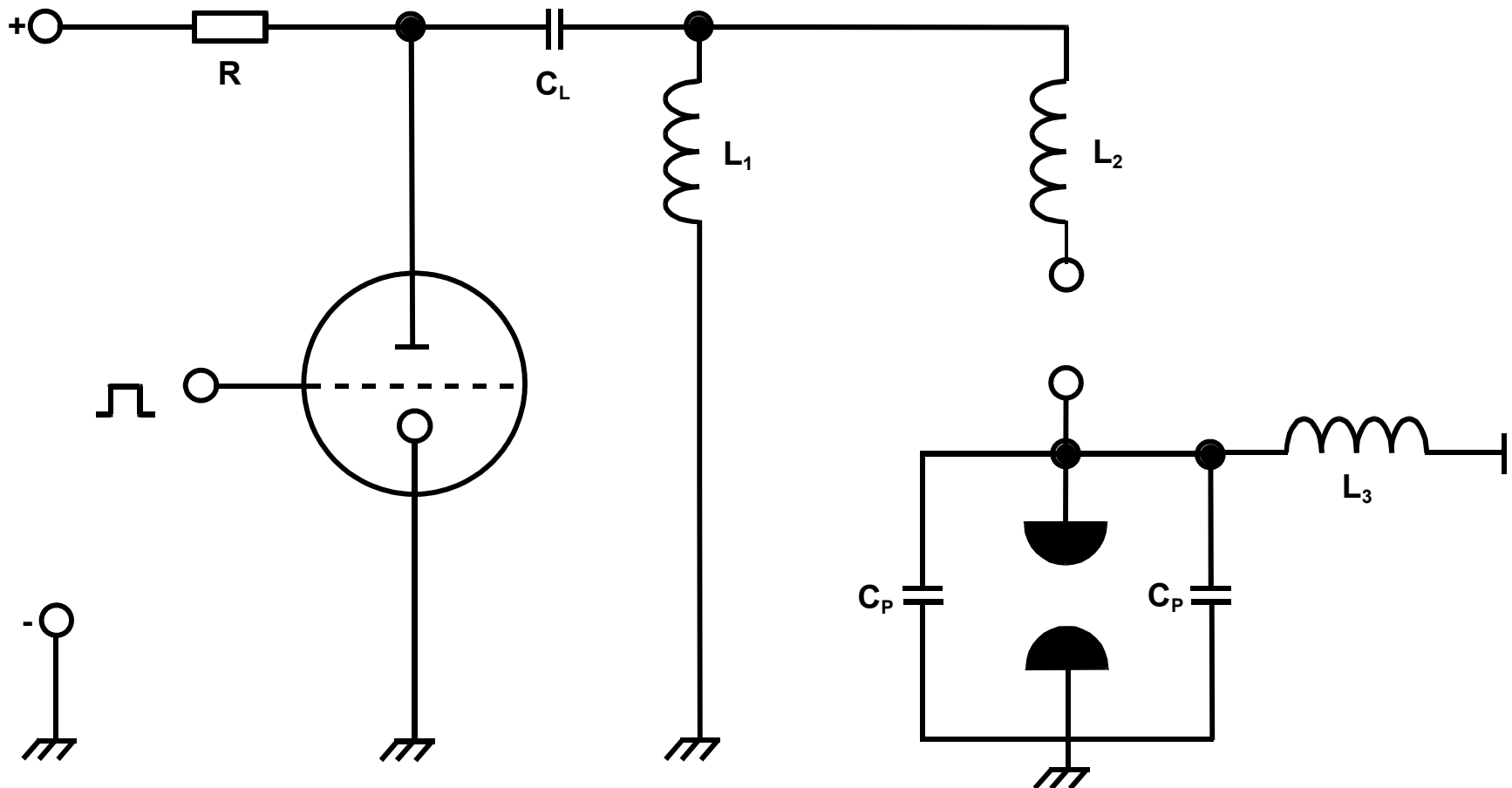


Typical voltages

Heater: 5 - 8V; typ.: 6,3V DC
Reservoir: 5 - 8V; typ.: 6,3V DC

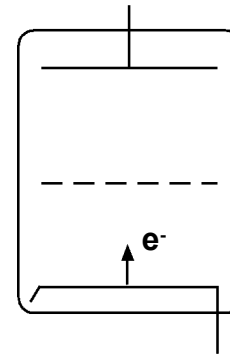


OPTex – HV-Circuit

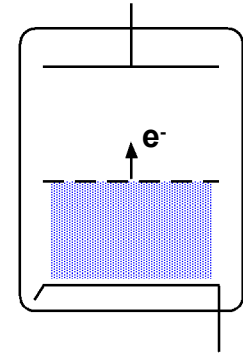


How Thyratrons Work

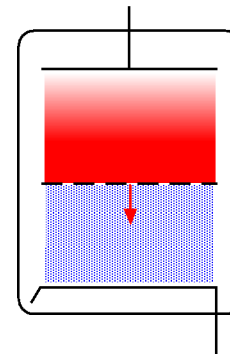
- Negative bias keeps switch open.
- Oxide cathode heated to 750° C.
- Positive trigger pulse of sufficient energy forms a plasma in grid-cathode gap.
- Plasma propagates through grid and causes breakdown of high voltage region between anode and grid (called switching or commutation).
- Further ionization results in complete closure of the switch.
- Typical commutation time is 20 ns.



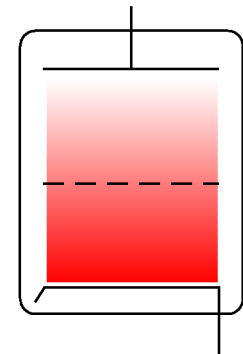
1. Trigger pulse applied to control grid



2. Grid-cathode breakdown

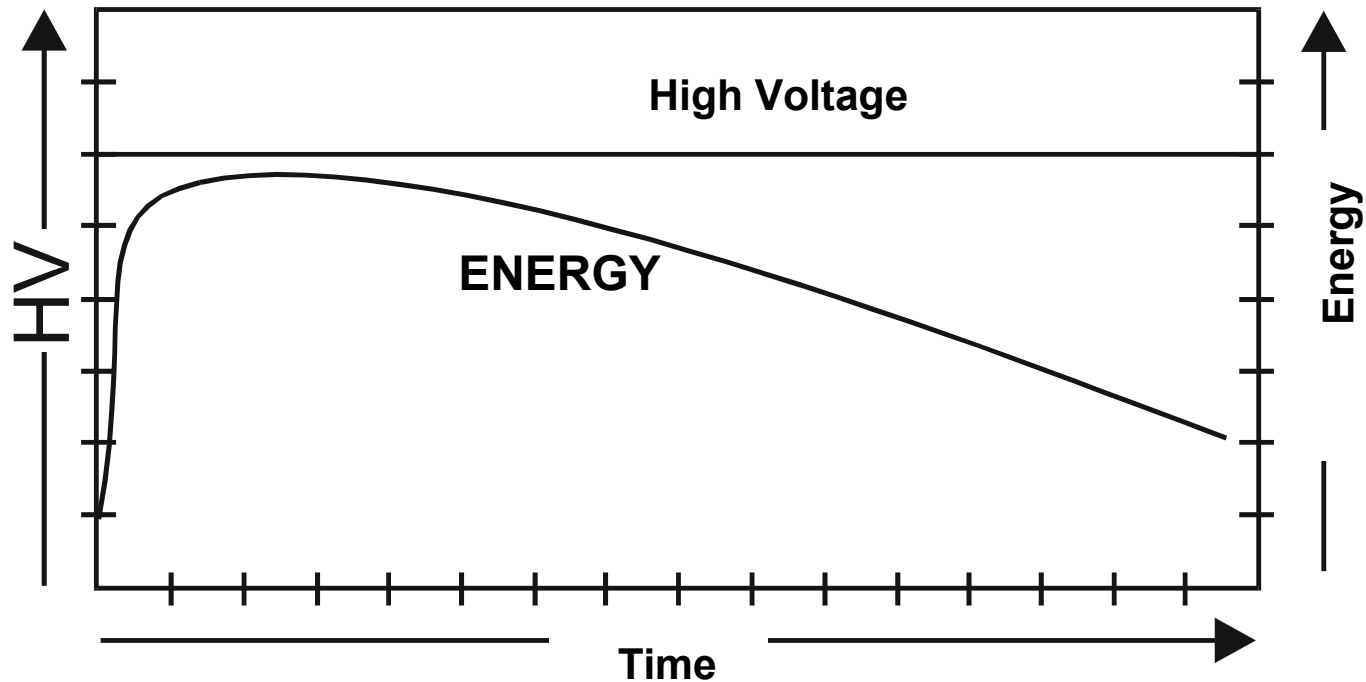


3. Electrons from grid-cathode region create a dense plasma in the grid-anode region. The plasma front propagates toward the cathode via breakdown of gas.

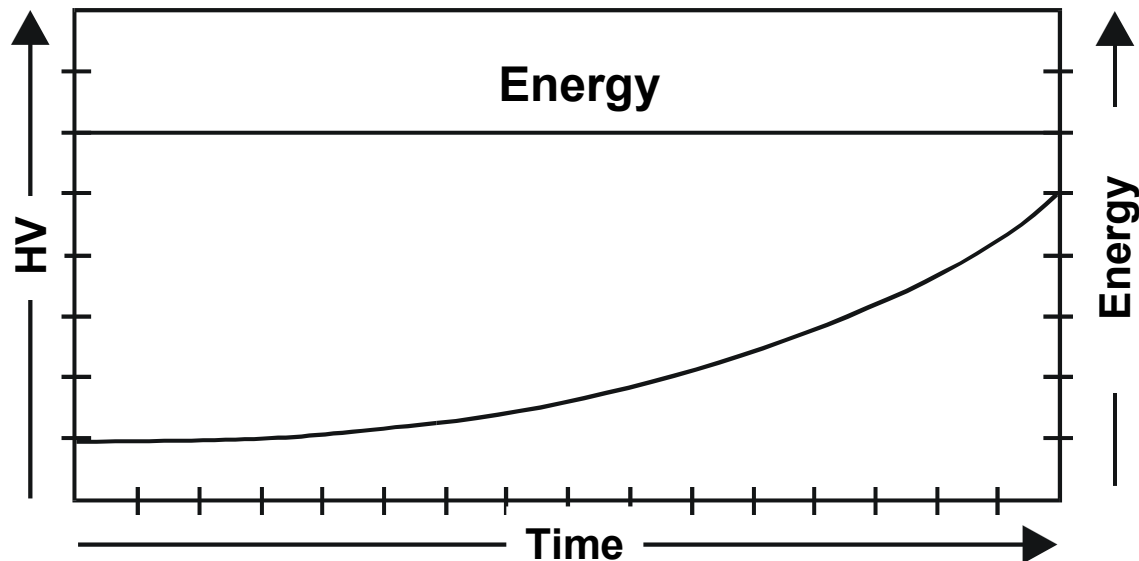


4. Closure

OPTex® – HV Constant Mode

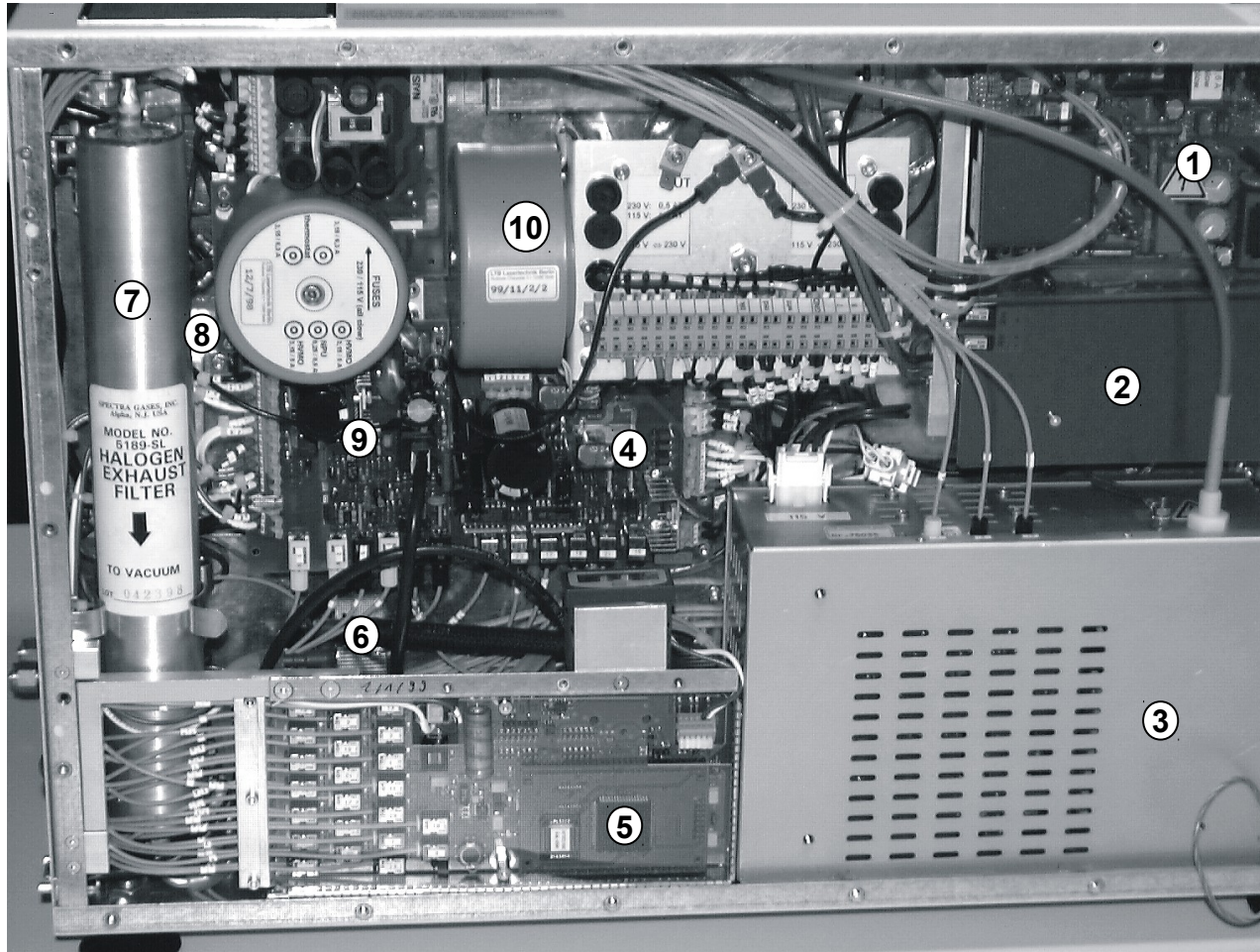


OPTex® – Energy Constant Mode (Energy Control)



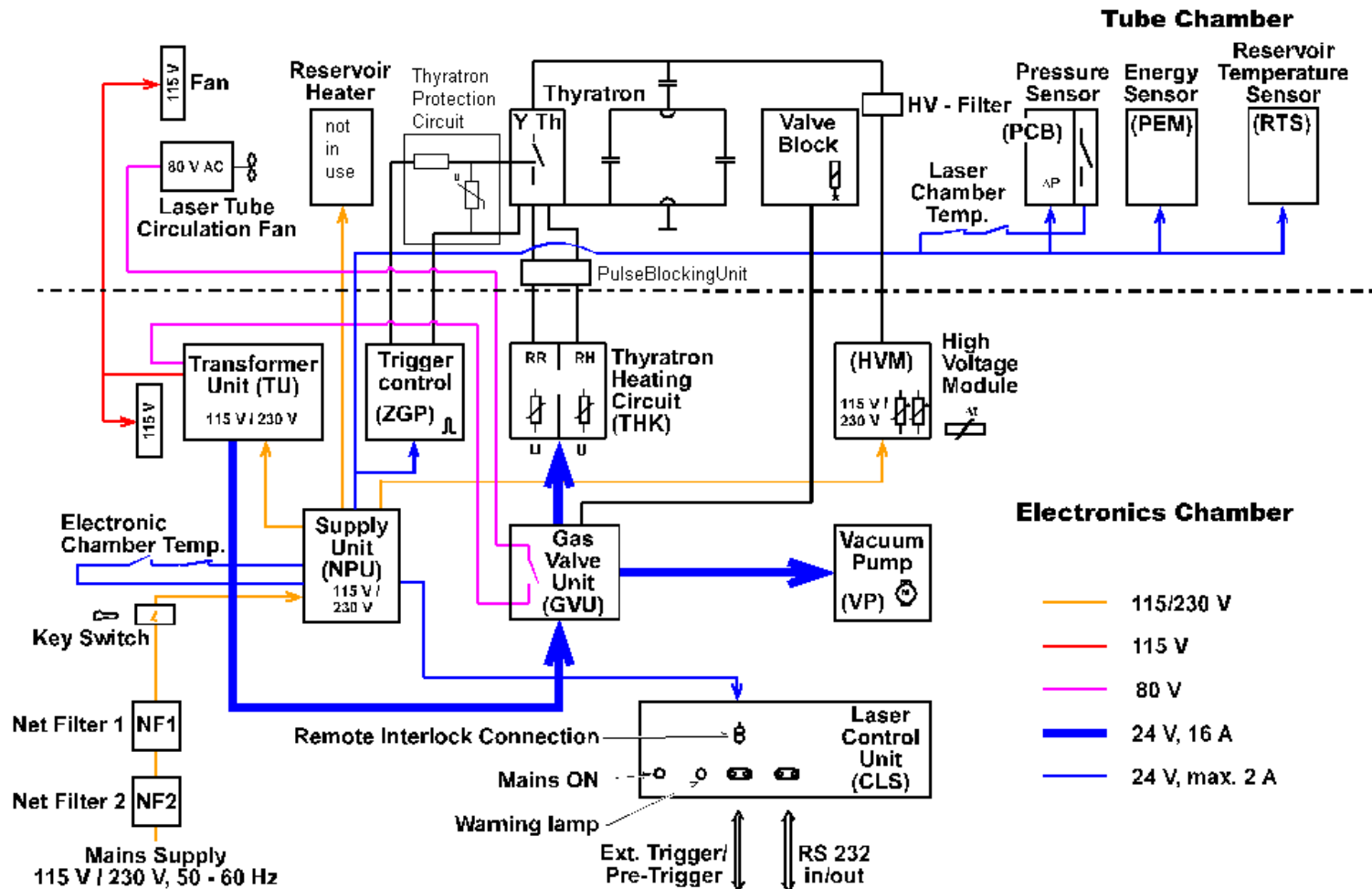
no gas actions performed

OPTex® – Electronics Chamber

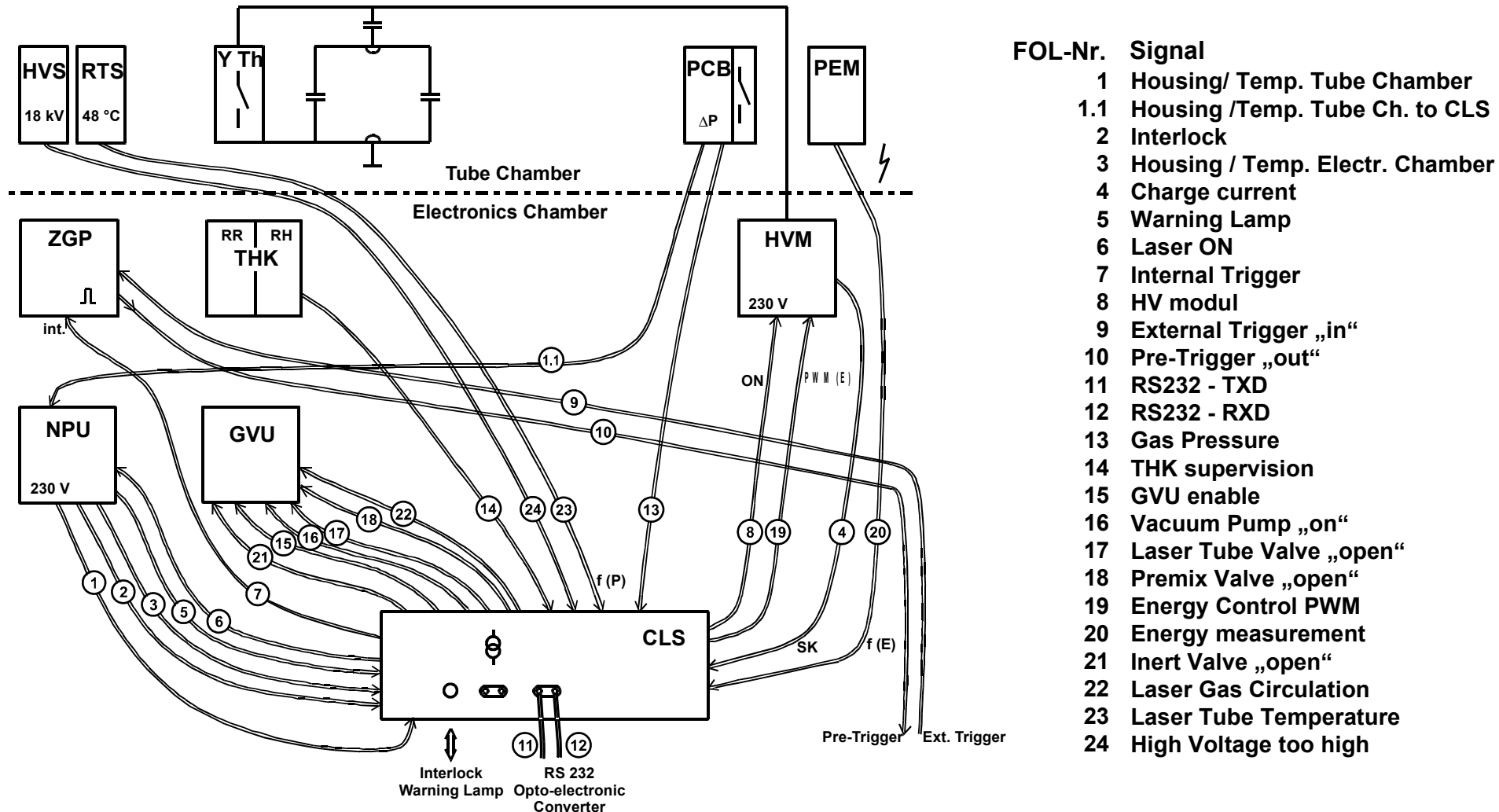


- 1 - Trigger Board**
- 2 - Thyatron Supply Board**
- 3 - High Voltage Module**
- 4 - Gas Handling Unit**
- 5 - Laser Control Unit**
- 6 - Vacuum Pump**
- 7 - Halogen Filter**
- 8 - Mains Filter**
- 9 - Power Supply Module**
- 10 - Transformer Unit**

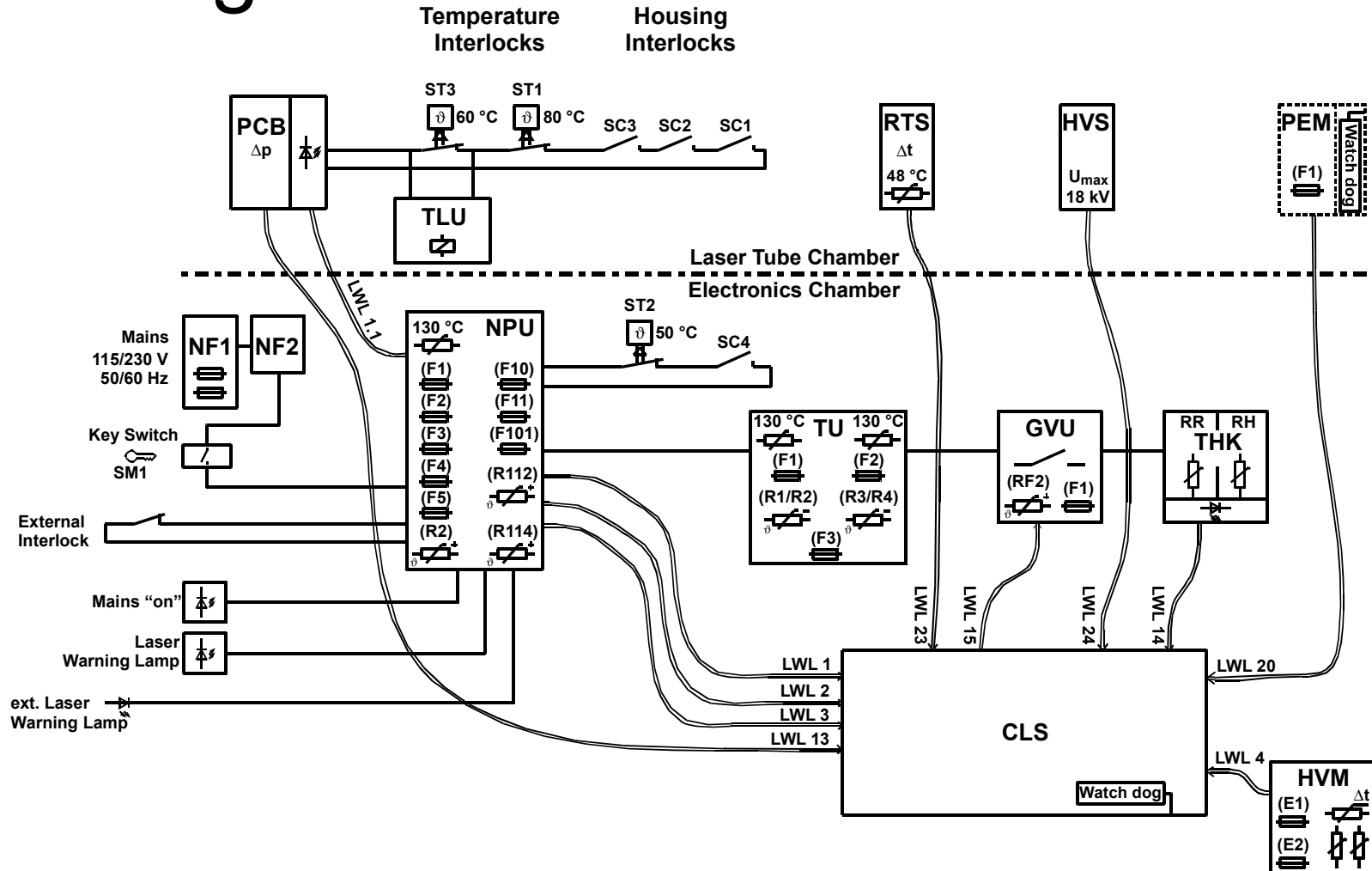
OPTex® – Electric Circuit



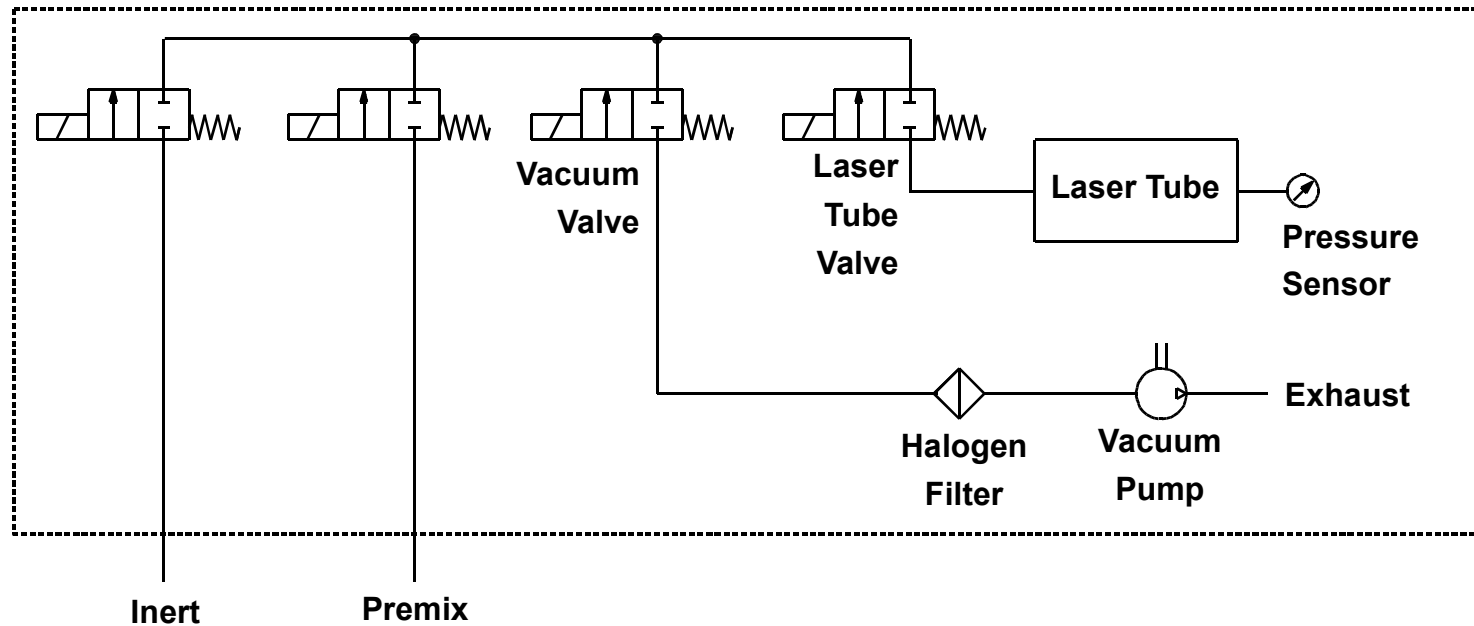
OPTex® – Optical Fiber Connections



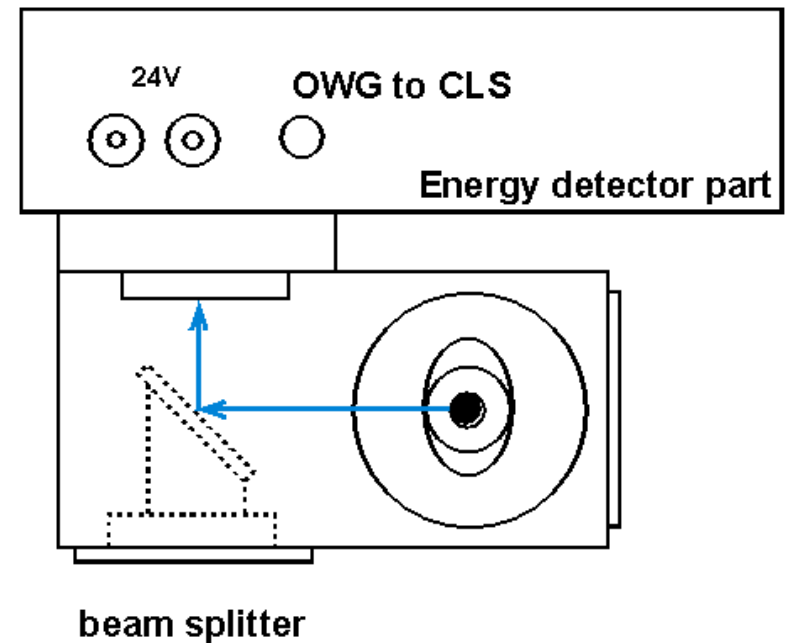
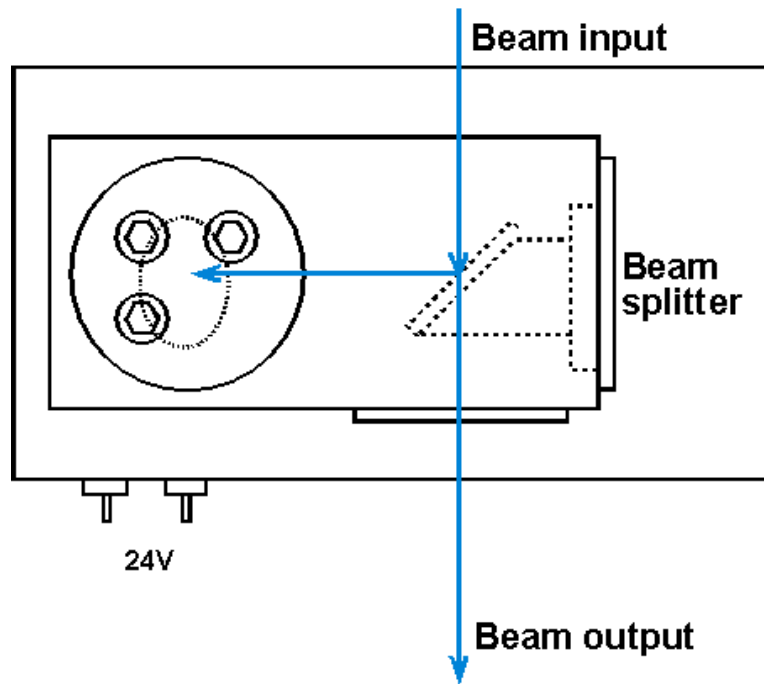
OPTex® – Safety / Interlocks / Warnings



OPTex® – Gas Flow Diagram



OPTex® – Energy Monitor



Thanks for your attention !!!!